January 8, 1959

MEMORANDUM FOR: Mr. George Kucera

SUBJECT : System VII

As your consultant on System VII, I feel that the system is drifing in a direction that will dangerously lower mission reliability. In my opinion, mission reliability has been lowered from some 75% to 25%* through the addition of automatic signal recorder activation. If the information is worth $10,000,000 to the U.S. (which I believe is a minimum value), a 50% reduction in the probability of success costs $5,000,000.

The present system configuration as supported by OSI and HRB uses automatic signal activation of the recorder. I believe that this type of activation in our carrier will lose some 10 to 15 db. of sensitivity. (OSI and HRB challenge these figures, claim only 3 db.). The system must be very close to the maximum available sensitivity if it is to be successful against this weak signal. It is not possible to say positively but I believe, through my analysis of the problem that the automatic system has insufficient sensitivity to intercept the signal. The reduction of mission reliability comes through this loss in sensitivity stated above and the loss of equipment reliability due to its complexity.

Several people around the System VII conference table believe that the higher fidelity and lesser readout time of a short high speed recording made by automatic signal activation of a 60 in/sec. Ampex (12 minutes running time) is of sufficient importance to override the mission reliability losses. For reasons given below, this conclusion doesn't seem valid.

The necessary fidelity of recording has been checked at the Jet Propulsion Labs and the fidelity as required to evaluate the major parameters of the missile system can be met with a system IV recorder running at 15 inch/sec. The additional fidelity of the 60 in/sec. recording does not seem then to be highly significant. The additional readout time on the manual system is approximately two man-days at a cost of perhaps $200.00 per mission.

*These estimates follow from (a) 100% interceptible with the manual system and an expected 75% equipment reliability figure and (b), a 50% interceptibility figure for the automatic system and an expected 50% equipment reliability figure (75 x 100 and 50 x 50).

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The automatic and complex system as proposed will cost more to build and check out than the simpler manual system. A manual recording using the System IV recorder and turned on by the pilot at a predetermined time would give a continuous two hour recording which is all the time that the air craft can be kept in the area, according to your operations people.

It has been said that the System IV recorder has not operated at 15 in/sec. in the environment required. This is true but against this we have (a) the automatic feature proposed has not operated under any environment and (b), it is highly likely that no problem exists in using the system IV recorder since it has operated both at the speeds required and in the environment required although not simultaneously.

I have made these ponts during our conference sessions but being a consultant have not insisted on them. Major Hippert seems to have decided in favor of the automatically operated and more complex system. This course of action is likely to result in a failure to intercept followed by a rebuilding of the system for manual operation and a System IV recorder at considerable cost and loss of time. It would seem to me more practical to carry a high probability system that would give the major parameters of the missile system under attack and reserve the question of refining the system at the expense of reliability after we have determined whether or not we can afford the loss of reliability without losing the intercept.

[redacted] Director of Research at Stanford University, 25X1
who shares my concern that the threshold of the automatic feature is likely to defeat the entire project through reduced effective sensitivity, has suggested a compromise solution incorporating both the reliable high-sensitivity system and the high quality automatic recording, (if it has sufficient value to justify its inclusion). He suggests the System IV recorder manually started running at 15 inch/sec. This gives two hours of running time. The automatic feature desired by OSI and HRB can then be given an overide feature to speed up the recorder to 60 inch/sec. during its operation. This plan will require a two speed motor on the recorder and perhaps a new head since it is expected that the present head although satisfactory for 15 in/sec. speeds will not be adequate for high quality 60 in/sec. The plan has still one of the disadvantages of any automatic system, a threshold set too low might be tripped by noise and use up all the recording time at 60 in/sec. before an intercept occurred. If a large enough threshold were set into the operation this possibility could be minimized but not eliminated.

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cc; Mr. Bissell
Major Hippert

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